Monitoring and mapping forest fires in the south-western Indian Ocean using very high resolution optical imagery

Christophe Révillion, Thibault Catry

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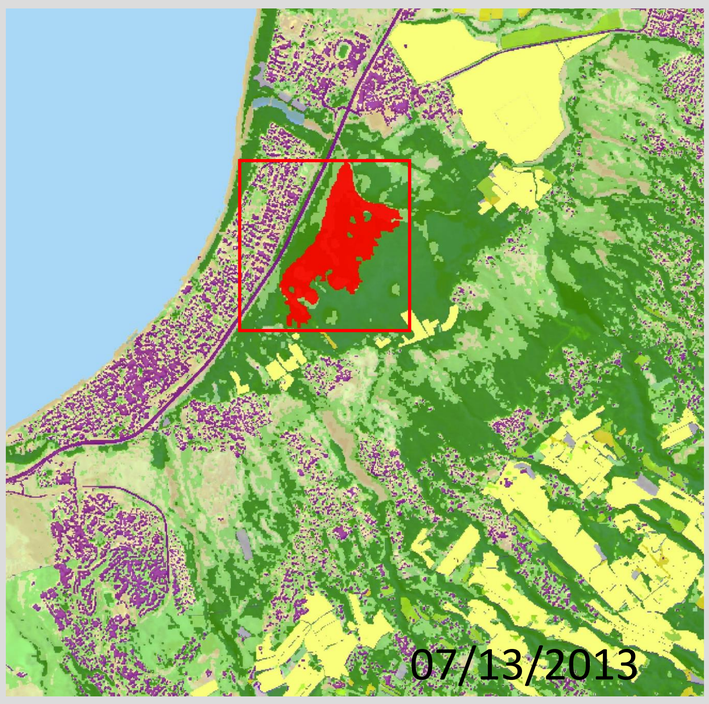
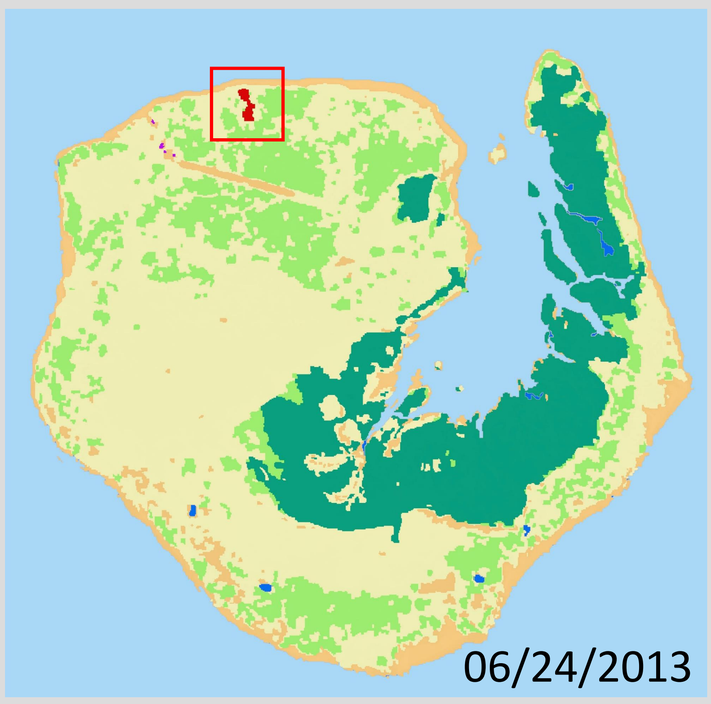
1) The South-western Indian Ocean is characterized by various heterogeneous insular territories. Many of these islands are biodiversity hotspots and in order to preserve this heritage, some of them are protected.

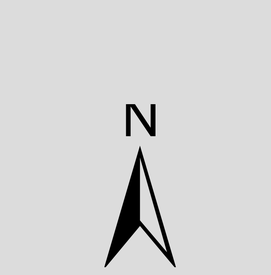
2) In 2013, the monitoring and mapping of the fires of Etang-Saint-Paul (July, La Reunion) and Europa (June) were carried out by the SEAS-OI (Survey of Environment Assisted by Satellites in the Indian Ocean), in collaboration with the ONF (Office National des Forêts) of La Reunion and the SDIS (Service Départemental d'Incendie et de Secours), using high resolution SPOT 5 imagery. These maps allowed the estimation of the fire extent, to about 4 and 70 hectares for Europa and Etang-Saint-Paul respectively, and to support field intervention during the crisis.



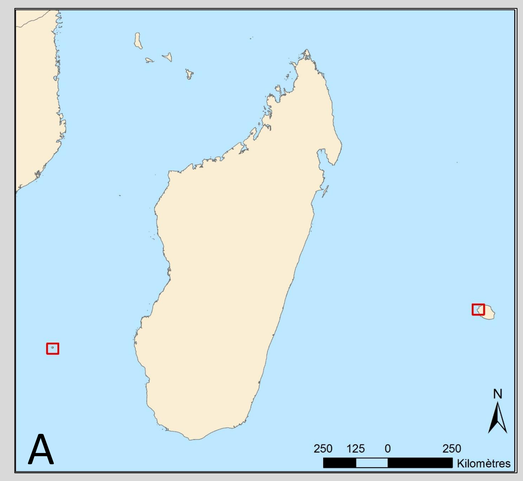
Extent of the fire on the St-Paul pond

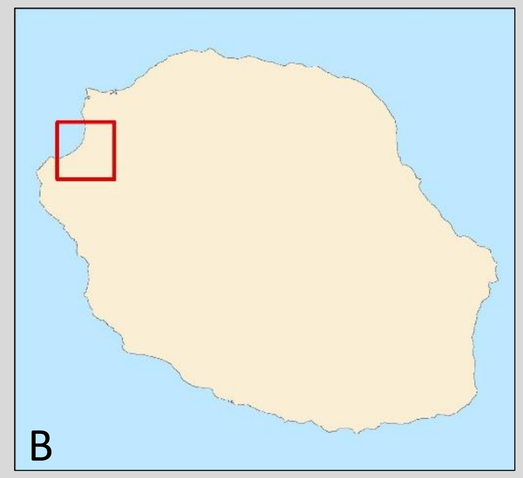


Burned area on Europa island



SPOT 5 imagery





The Study areas, Europa and La Reunion (A) and focus on Saint-Paul (B)

Land cover

Anthropogenic
- Urban
- Pasture
- Cropland

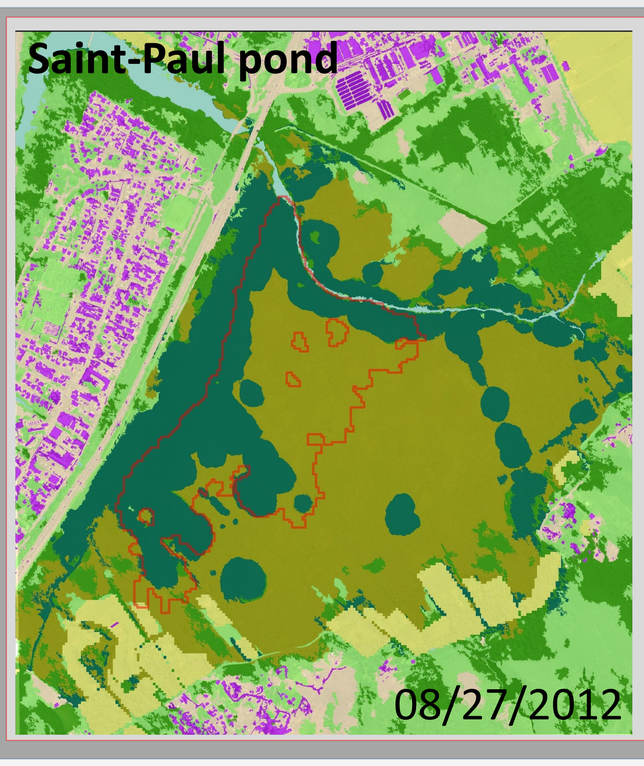
Forest or semi-natural
- Forest
- Non forest vegetation
- Herbaceous cover
- Barren land

Wetland and water
- Aquatic vegetation with Typha domingensis
- Aquatic vegetation with Cyperus papyrus
- Mangrove
- Water

Fire and recovery
- Delimitation of the burned area
- burned area
- Barren land area after the fire
- Recovery in progress by the wet vegetation

Exemple of Typha Domingensis (A) and Cyperus papyrus (B)

3) The monitoring of the post-fire recovery was realized using Pléiades images. Very high spatial resolution images allowed us to understand more precisely how different plant groupings recovered after the fire.
On the pond of Saint-Paul vegetation dominated by Cyperus Papyrus (in dark green on map) is almost back to its pre-fire condition in six months, however areas with Typha domingensis began to regenerate but much more slowly.



PLEIADES imagery

4) This study was part of the operational mission of the SEAS-OI station, gathering local actors in the management of forest fire crisis in the south-western Indian Ocean. In particular, we demonstrate here the interest of the satellite approach in the management of natural disasters on remote territories like Europa island, and in protected area where a rapid response is needed. Thanks to the combination of optical SPOT 5 and PLEAIDES high resolution products, SEAS-OI was able to provide operational products for the management of these fires, and the monitoring of .

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